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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,811	07/14/2003	Jin-Young Lee	61610078US	4174
58027	7590	03/17/2006	EXAMINER	
H.C. PARK & ASSOCIATES, PLC 8500 LEESBURG PIKE SUITE 7500 VIENNA, VA 22182			LEE, CYNTHIA K	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 03/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/617,811

Applicant(s)

LEE ET AL.

Examiner

Cynthia Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 14-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/11/2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Election/Restrictions

Applicant's election with traverse of Group I claims 1-13 in the reply filed on 1/6/2006 is acknowledged. The traversal is on the ground(s) that a thorough search for the subject matter of any one Group of claims would encompass a search for the subject matter of the remaining claims and that the examination of the entire application could be made without serious burden. This is not found persuasive.

To provide evidence of undue burden on the Examiner, MPEP 808.02 states that for related but distinct inventions, undue burden exist if one or more of the following can be shown: A) separate classification, b) separate status in the art if inventions are classifiable together, or c) a different field of search is shown even if the inventions are classifiable together. The Examiner has shown in the previous restriction requirement that the two groups of invention are separately classified which meets the undue burden requirement as set forth in the MPEP.

The requirement is still deemed proper and is therefore made FINAL.

Priority

Acknowledgement has been made of applicant's claim for priority under 35 USC 119 (a-d). The certified copy has been filed on 8/23/2003.

Information Disclosure Statement

The Information Disclosure Statement (IDS) filed 8/11/2005 has been placed in the application file and the information referred to therein has been considered.

Drawings

The drawings received 7/14/2003 are acceptable for examination purposes.

Specification

The disclosure is objected to because in phosphate and phosphorodiamidite are not phosphonate groups as disclosed in pg. 8-9.

Appropriate correction is required.

Claims Analysis

The process limitation "formed by polymerizing a phosphonate compound with a polymerizable functional unsaturated hydrocarbon group" has been considered but was not given patentable weight because the courts have held that the method of forming the product is not germane to the issue of patentability of the product itself. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 12 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is unclear what is the final product of the compound that contains phosphonate because the unsaturated hydrocarbon groups claimed in claim 12 do not exist in the final product. To the extent the claims are understood in view of the 35 USC 112, 2nd paragraph rejection, note the following prior art rejections herein below.

Claims 12 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which

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applicant regards as the invention. It is unclear because phosphate and phosphorodiamidite are not phosphonate groups.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

As best understood, claims 1-4, 9-11, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Naoki (JP 11-273731).

Naoki discloses a lithium ion secondary battery comprising a positive electrode including a material that is capable of reversible intercalation/deintercalation of lithium ions as a positive material (particularly LiCoO_2 , LiMn_2O_4 , LiNiO_2), a negative electrode including a material capable of reversible intercalation/deintercalation of lithium ions as a negative material, a separator interposed between the positive and negative electrodes, and an electrolyte on the separator wherein the electrolyte includes a non-aqueous organic solvent, a lithium salt (Fig. 1 and [0031, 0033]). (Applicant's claim 1)

Naoki discloses using non-aqueous organic solvents comprising cyclic and linear carbonates, such as ethylene carbonate (EC), propylene carbonate (PC), dimethyl carbonate (DMC), methylethyl carbonate (MEC), diethylene carbonate (DEC) [0028]. (Applicant's claims 2-4)

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Naoki discloses lithium salts comprising LiPF₆, LiBF₄, LiClO₄, LiN(SO₂CF₃)₂, LiC(SO₂CF₃)₃ in the amount of between 1M and 1.7M [0029]. (Applicant's claims 9 and 10)

Naoki discloses wherein the electrolyte includes a polymerized phosphoric ester, as illustrated as formula. 3.

Naoki discloses all the elements of claim 11 and is incorporated herein. The vol% of the phosphoric ester polymer is 5 vol%. Naoki does not disclose the density of the polymer to define a wt% of polymer in the electrolyte. The Office notes that the density of most materials is about 1g/ml and thus, vol% is approximately weight %.

Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. See MPEP 2144.05.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

As best understood, claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-273731) in view of Yeager (US 2002/0177027).

Naoki discloses all the elements of claim 11 and is incorporated herein. Naoki does not disclose wherein the electrolyte includes a phosphonate as claimed in claim 12

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in the intermediate product. However, Yeager discloses that dialkylvinylphosphonates, such as diethylvinylphosphonate ([0071], lines 11-12 from the bottom) are used as flame retardants. It is commonly known in the art that thermal instability and explosions are problems with batteries, particularly Li ion batteries, as disclosed by Naoki [0003]. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to polymerize dialkylvinylphosphonates instead of a phosphoric ester for the benefit of reducing explosions and thus, making a safer Li ion battery. Considering the limited number of species in the class of dialkylvinylphosphonates, it is found that dimethylvinylphosphonate and dipropylvinylphosphonate are obvious for the same reason given above.

Yeager teaches that dialkylvinylphosphonates are flame retardants, thus clearly teaching that dialkylvinylphosphonate is a result effective variable. It has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

As best understood, claims 1, 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (US 6413677) in view of Yeager (US 2002/0177027) and Tsutsumi (US 6645671).

Naoki discloses a lithium ion secondary battery comprising a positive electrode including a material that is capable of reversible intercalation/deintercalation of lithium ions as a positive material (particularly LiCoO_2 , LiMn_2O_4 , LiNiO_2), a negative electrode

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including a material capable of reversible intercalation/deintercalation of lithium ions as a negative material, a separator interposed between the positive and negative electrodes, and an electrolyte on the separator wherein the electrolyte includes a non-aqueous organic solvent, a lithium salt (1:15-60, 6:50-60, 7:1-20). (Applicant's claim 1)

Naoki discloses of using a phosphoric ester polymer in the electrolyte solution, see Fig. 3.

Naoki discloses using non-aqueous organic solvents comprising carbonates, such as ethylene carbonate (EC), propylene carbonate (PC), dimethyl carbonate (DMC), methylethyl carbonate (MEC), diethylene carbonate (DEC) [0028]. (Applicant's claims 2-4) and does not disclose that the non-aqueous solvent comprises a mixed solvent of a carbonate solvent and an aromatic hydrocarbon solvent (applicant's claims 5-8). However, Tsutsumi discloses of using a combination of high-permittivity solvent and a low-viscosity solvent for the benefit of obtaining high charging/discharging efficiency, as well as to keep the viscosity low. Examples of high-permittivity solvents include cyclic carbonates (7:1-8). Examples of aromatic hydrocarbons include benzene, toluene, and xylene, as low-viscosity solvents (7:1-25). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an aromatic hydrocarbon, such as benzene, toluene, and xylene to Naoki's Li ion battery for the benefit of reducing the electrolyte viscosity.

Naoki discloses of using the high-permittivity solvents and low viscosity solvents in a volume ratio of preferable 1:4 to 2:1, preferably 1:2 to 1:1 (7:40-45). Carbonate solvent is a high permittivity solvent and aromatic hydrocarbon is a low viscosity solvent

and it has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

As best understood, claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Naoki (JP 11-273731) as applied to claim 11 and incorporated herein.

Naoki discloses all the elements of claim 11. Naoki discloses that the phosphoric ester polymer is 5 vol% and not wt%. However, Naoki discloses that phosphoric ester polymers impart flameproofing properties to the electrolyte solution, thus clearly teaching that phosphoric ester polymer is a result effective variable. It has been held by the courts that discovering an optimum value or workable ranges of a result-effective variable involves only routine skill in the art, and thus not novel. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). See MPEP 2144.05.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Lee whose telephone number is 571-272-8699. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ckl

Cynthia Lee

Patent Examiner



RAYMOND ALEJANDRO
PRIMARY EXAMINER